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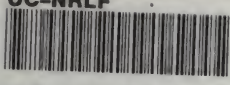
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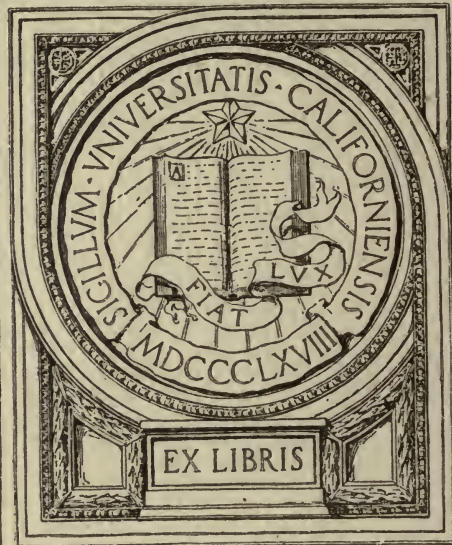
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Circular
for the information of
Persons Desiring to Enter the
Navy as Acting Ensigns
for Engineering Duty

1918



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Persons Desiring to Enter the
Navy as Acting Ensigns
for Engineering Duty

1918



WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

Note.—Next examination will be held January 2, 3, 4,
and 5, 1918

CIRCULAR FOR THE INFORMATION OF PERSONS DESIRING TO ENTER THE NAVY AS ACTING ENSIGNS FOR ENGINEERING DUTY.

An act of Congress approved August 23, 1916, authorizes the permanent appointment of 30 acting ensigns annually, as follows:

"That the Secretary of the Navy is hereby authorized to appoint annually in the line of the Navy for a period of ten years following the passage of this act, in the order of merit determined by such competitive examination as he may prescribe, thirty acting ensigns for the performance of engineering duties only. Persons so appointed must have received a degree of mechanical or electrical engineer from a college or university of high standing or be graduates of technical schools approved by the Secretary of the Navy, must have been found physically qualified by a board of medical officers of the Navy for the performance of the duties required, and must at the time of appointment be not less than twenty nor more than twenty-six years of age. Such appointments shall be for a probationary period of three years, and may be revoked at any time by the Secretary of the Navy.

"Such acting ensigns shall, upon the completion of the probationary period of three years, of which two years shall have been spent on board cruising vessels and one year pursuing a course of instruction at the Naval Academy prescribed by the Secretary of the Navy, be commissioned in the grade of lieutenant of the junior grade after satisfactorily passing such examination as may be prescribed by the Secretary of the Navy, and having been recommended for promotion by the examining board and found physically qualified by a board of medical officers of the Navy.

"Such officers shall thereafter be required to perform engineering duties only, and shall be eligible for advancement to the higher grades in the manner herein provided for line officers assigned to engineering duty only."

APPOINTMENT.

A candidate for appointment as acting ensign for engineering duty must have received a degree of mechanical or electrical engineer from one of the following schools and must, *at the time of appointment*, be a citizen of the United States, not less than 20 nor more than 26 years of age, a candidate who has passed his twenty-sixth birthday not being eligible. Attention is particularly invited to the italicized portion of the preceding sentence. Although a candidate may successfully pass the professional and physical examination his appointment can not be made unless he is within the prescribed age limit at the time he accepts an appointment that may be tendered by the department after passing all examinations. The age limit is prescribed by law and the Navy Department has no discretion in the matter of waiving same.

Therefore, no person will be permitted to appear who will pass his twenty-sixth birthday within two months after the date set for the examination. This is done in order to prevent candidates from going to the trouble and expense of appearing for examination when it is certain that they can not be examined, have their papers marked by the local board in Washington, and their appointments issued and accepted before reaching the statutory age limit of 26.

SCHOOLS WHOSE GRADUATES IN ELECTRICAL OR MECHANICAL ENGINEERING ARE ELIGIBLE TO APPEAR FOR EXAMINATION FOR APPOINTMENT AS ACTING ENSIGN FOR ENGINEERING DUTY.

Agricultural and Mechanical College of Texas, College Station, Tex.
 Alabama Polytechnic Institute, Auburn, Ala.
 Armour Institute of Technology, Chicago, Ill.
 Brown University, Providence, R. I.
 Carnegie Institute of Technology, Pittsburgh, Pa.
 Case School of Applied Science, Cleveland, Ohio.
 Catholic University, Washington, D. C.
 Clarkson College of Technology, Potsdam, N. Y.
 Clemson Agricultural College, Clemson College, S. C.
 College of the City of New York, New York City, N. Y.
 Colorado Agricultural College, Fort Collins, Colo.
 Colorado School of Mines, Golden, Colo.
 Columbia University, New York City, N. Y.
 Cornell University, Ithaca, N. Y.
 Dartmouth College, Hanover, N. H.
 Delaware College, Newark, Del.
 Drexel Institute, Philadelphia, Pa.
 George Washington University, Washington, D. C.
 Georgia School of Technology, Atlanta, Ga.
 Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.
 Johns Hopkins University, Baltimore, Md.
 Kansas State Agricultural College, Manhattan, Kans.
 Lafayette College, Easton, Pa.
 Lehigh University, South Bethlehem, Pa.
 Leland Stanford Jr University, Stanford University, Cal.
 Louisiana State University and Agricultural and Mechanical College, Baton Rouge, La.
 Maryland State College of Agriculture, College Park, Md.
 Massachusetts Institute of Technology Cambridge, Mass.
 Michigan Agricultural College, East Lansing, Mich.
 Michigan College of Mines, Houghton, Mich.
 Mississippi Agricultural and Mechanical College, Agricultural College, Miss.
 Missouri State School of Mines, Rolla, Mo.
 Montana State College of Agriculture and Mechanic Arts, Bozeman, Mont.
 Montana State School of Mines, Butte, Mont.
 Municipal University of Akron, Akron, Ohio.
 New Hampshire College of Agriculture and Mechanic Arts, Durham, N. H.
 New Mexico College of Agriculture and Mechanic Arts, State College, N. Mex.
 New Mexico School of Mines, Socorro, N. Mex.
 New York University, New York City, N. Y.
 North Carolina College of Agriculture and Mechanic Arts, West Raleigh, N. C.
 North Dakota Agricultural College, Agricultural College, N. Dak.
 Northwestern University, Evanston, Ill.
 Norwich University, Northfield, Vt.
 Ohio Northern University, Ada, Ohio.
 Ohio State University, Columbus, Ohio.
 Oklahoma Agricultural and Mechanical College, Stillwater, Okla.
 Oklahoma School of Mines and Metallurgy, Wilburton, Okla.
 Oregon Agricultural College, Corvallis, Ore.
 Pennsylvania College, Gettysburg, Pa.
 Pennsylvania Military College, Chester, Pa.

Pennsylvania State College, State College, Pa.
 Polytechnic Institute of Brooklyn, Brooklyn, N. Y.
 Princeton University, Princeton, N. J.
 Purdue University, Lafayette, Ind.
 Rensselaer Polytechnic Institute, Troy, N. Y.
 Rhode Island State College, Kingston, R. I.
 Rice Institute, Houston, Tex.
 Rose Polytechnic Institute, Terre Haute, Ind.
 Rutgers College, New Brunswick, N. J.
 South Carolina Military Academy (The Citadel), Charleston, S. C.
 St. John's College, Annapolis, Md.
 State College of Washington, Pullman, Wash.
 State University of Iowa, Iowa City, Iowa.
 Stevens Institute of Technology, Hoboken, N. J.
 Syracuse University, Syracuse, N. Y.
 Throop College of Technology, Pasadena, Cal.
 Tufts College, Tufts College, Mass.
 Tulane University of Louisiana, New Orleans, La.
 Union College, Schenectady, N. Y.
 University of Alabama, University, Ala.
 University of Arizona, Tucson, Ariz.
 University of Arkansas, Fayetteville, Ark.
 University of California, Berkeley, Cal.
 University of Colorado, Boulder, Colo.
 University of Cincinnati, Cincinnati, Ohio.
 University of Florida, Gainesville, Fla.
 University of Idaho, Moscow, Idaho.
 University of Illinois, Urbana, Ill.
 University of Kansas, Lawrence, Kans.
 University of Kentucky, Lexington, Ky.
 University of Maine, Orono, Me.
 University of Michigan, Ann Arbor, Mich.
 University of Minnesota, Minneapolis, Minn.
 University of Mississippi, University, Miss.
 University of Missouri, Columbia, Mo.
 University of Nebraska, Lincoln, Nebr.
 University of Nevada, Reno, Nev.
 University of North Carolina, Chapel Hill, N. C.
 University of North Dakota, University, N. Dak.
 University of Notre Dame, Notre Dame, Ind.
 University of Oklahoma, Norman, Okla.
 University of Pennsylvania, Philadelphia, Pa.
 University of Pittsburgh, Pittsburgh, Pa.
 University of Rochester, Rochester, N. Y.
 University of South Dakota, Vermillion, S. Dak.
 University of Tennessee, Knoxville, Tenn.
 University of Texas, Austin, Tex.
 University of Utah, Salt Lake City, Utah.
 University of Vermont, Burlington, Vt.
 University of Virginia, Charlottesville, Va.
 University of Washington, Seattle, Wash.
 University of Wisconsin, Madison, Wis.
 University of Wyoming, Laramie, Wyo.
 Vanderbilt University, Nashville, Tenn.

Virginia Military Institute, Lexington, Va.
 Virginia Polytechnic Institute, Blacksburg, Va.
 Washington University, St. Louis, Mo.
 West Virginia University, Morgantown, W. Va.
 Worcester Polytechnic Institute, Worcester, Mass.
 Yale University, New Haven, Conn.

APPLICATION.

Applications for appointment should be made to the Chief of Bureau of Navigation, Navy Department, Washington, D. C., and one requirement is that the application be in the *handwriting* of the candidate, and in the following form:

.....,
, 191....

SIR:

I request permission to be examined at for appointment as acting ensign for engineering duty. I was born at on day of; and am a citizen of the United States, residing in, County of, in the State of

My occupation is that of; am a graduate of; character of degree received.

The following is a description of my scientific work performed before or after graduation:

I am inclosing certificates as to moral character, habits, and citizenship; also a certificate from the faculty of the above-mentioned school (or college) which shows the full course pursued, my relative standing, the degree conferred on me, and my deportment as a student.

Very respectfully,

The CHIEF OF BUREAU OF NAVIGATION,
Navy Department, Washington, D. C.

Applications must be accompanied by testimonials as to citizenship, good moral character, and correct habits from at least two persons of prominence who have personally known the applicant long enough to form a correct opinion of him.

Upon the receipt of an application for appointment as acting ensign same will be promptly acknowledged, and if the candidate is considered eligible a permit will be issued in time to enable him to appear for the professional examination.

PROFESSIONAL EXAMINATION.

The professional examination of candidates will be held simultaneously throughout the United States, after which all papers will be forwarded to the local board at Washington, D. C., for marking. When this has been done permits will be issued to the successful candidates authorizing them to appear for the physical examination.

Candidates should promptly advise the Bureau of Navigation of any change of address in order that permits, if issued, may reach them promptly.

The following *sample* schedule of subjects and *sample* set of questions are given in order that candidates may have an idea of the scope of the professional examination:

Day.	Time.	Subjects.	From—
	<i>Hours.</i>		
First.....	3	Engines (sheet A).....	9 a. m. to 12 m.
	3	Boilers (sheet B).....	2 to 5 p. m.
Second....	3	Auxiliary machinery (sheet C).....	9 a. m. to 12 m.
	3	Internal combustion and explosive engines (sheet D).....	2 to 5 p. m.
Third.....	3	Electricity (sheet E).....	8.30 to 11.30 a. m.
	2½	Applied mechanics (sheet F).....	12.30 to 3 p. m.
	2½	Heat and thermodynamics (sheet G).....	3.15 to 5.45 p. m.
Fourth....	2½	Hydraulics (sheet H).....	9 to 11.30 a. m.
	3	Shop practice (sheet I).....	2 to 5 p. m.

ENGINES.

(Sheet A.)

Time, 3 hours.

- En. 1. Describe a tandem compound high-speed engine and explain the action of its shaft governor.
- En. 2. Describe a Stephenson link valve gear.
Explain the meaning of the terms: Steam lap, Steam lead, Valve travel, Cut-off, and Angle of advance.
- En. 3. (a) What is the use of a cylinder liner?
(b) Sketch a method of securing a large piston to a piston rod.
(c) Explain the difference between a piston valve and a D-slide valve.
(d) Explain the Corliss valve gear.
- En. 4. Discuss in detail the fundamental principles of the Curtiss and the Parsons turbines. Sketch the type of blading used in each turbine.
- En. 5. Explain the principles of the steam engine indicator. Applied to the cylinder of a marine engine, what points are revealed directly by the diagram? What particulars may be calculated or inferred?

BOILERS.

(Sheet B.)

Time, 3 hours.

- B. 1. Name and describe a large water-tube boiler of well-known type. Sketch two views of the boiler, showing clearly its main features, and by arrows the circulation of the water and the gases of combustion.
- B. 2. Explain the theory of chimney draft.
Describe the forced and induced draft systems as used in large power plants.
- B. 3. Describe a gas analysis apparatus and its use as applied to smokestacks. Discuss the results obtained from its operation.
- B. 4. Name the advantages and disadvantages of oil fuel. Discuss boiler incrustation—causes, removal, and prevention.
- B. 5. Name the fittings for a high-pressure boiler.
What is the object of—
(a) Dry-pipe.
(b) Dead plate.
(c) Bridge wall.
(d) Corrugated furnace flue.
Discuss the relative merits of firing by hand and by mechanical stokers.

AUXILIARY MACHINERY.

(Sheet C.)

Time, 3 hours.

- Aux. 1. Describe a two-stage centrifugal pump. What advantage has a centrifugal pump for boiler feed purposes?
- Aux. 2. What is the office of a feed-water heater? Name two fundamental types of heater, and state advantages of each. What is the difference between an economizer and a feed heater? Make a diagram showing locations on a steam line of a separator and of a trap. Describe the action of the bucket trap.
- Aux. 3. Describe in detail with sketches a surface condenser.
- Aux. 4. What is the office of the circulating pump? What is meant by wet air pump?
By dry air pump? State where these pumps are used.
Describe a sight feed automatic lubricator and its action.
- Aux. 5. Describe, with sketch, a refrigerating plant suitable for ice making and cold storage.
Explain clearly how to set the slide valve of a small engine by observation of the valve itself.

INTERNAL COMBUSTION AND EXPLOSIVE ENGINES.

(Sheet D.)

Time, 3 hours.

- I. C. E. 1. Describe in detail the terms 2-cycle and 4-cycle as applied to gasoline engines.
- I. C. E. 2. Sketch the cross section of a carbureter for a gasoline engine. Describe its operation.
- I. C. E. 3. Describe, with diagrams, two systems of electric ignition for a gasoline engine.
- I. C. E. 4. Describe in detail how to start and stop a small gasoline engine. What are the usual causes of—
 - (a) Failure to start.
 - (b) Overheating.
 - (c) Knocking.
 - (d) Crank-case explosion.
- I. C. E. 5. Discuss a 4-cycle Diesel engine, explaining the cycle, method of ignition, pressures and temperatures employed, cooling system, kind of fuel.

ELECTRICITY.

(Sheet E.)

Time, 3 hours.

- E. 1. Describe briefly, and indicate when used—
 - (a) Booster.
 - (b) Dynamotor.
 - (c) Transformer.
 - (d) Rotary converter.
- E. 2. Describe a shunt motor, and a series motor. Name the conditions under which each operates to its best advantage.
- E. 3. Describe the Ward Leonard method of speed control of motors. Name two other systems of speed control.
- E. 4. What points are of chief importance in the operation and care of electrical generating machinery?
- E. 5. Make a wiring diagram for one panel of a lighting and power switchboard, to be used in connection with two direct-current shunt generators. Show necessary switches, fuses, voltmeter, ammeters, circuit breakers, etc.

APPLIED MECHANICS.

(Sheet F.)

Time, 2½ hours.

- A. M. 1. What work is done on a level track, in bringing up the velocity of a train weighing T tons, from zero to V miles per hour, if the change of speed is accomplished in a length of S feet? The total frictional resistance at any speed is f pounds per ton. Assume the motion to be uniformly accelerated, find the power to drive this train at a speed of V miles per hour.
- A. M. 2. Deduce a formula for the horsepower absorbed in friction in a shaft bearing X inches in diameter carrying a pressure of T tons, and making N revolutions per minute. Coefficient of friction is f .
- A. M. 3. A 12-inch I-beam has two flanges each 6 inches wide and 1 inch thick; the thickness of the web is 1 inch. This beam is centrally loaded with 20,000 pounds, and the span is 10 feet. Find the maximum fiber stress.
- A. M. 4. (a) Define coefficient of elasticity and coefficient of rigidity, giving a formula for, and explaining the symbols in each.
 (b) A force P acts along the piston rod due to steam pressure. The angle of connecting rod to piston rod is 30° . Show graphically the forces acting along the connecting rod and against the crosshead guides.

A. M. 5. Find the thickness of the shell plate of a cylindrical boiler 9 feet in diameter. The pressure in the shell is 160 pounds per square inch, the factor of safety is 6, and the tensile strength of the material is 54,000 pounds per square inch.

Find the diameter of a stay bolt for this boiler if each end supports 150 square inches; material of bolt same as for shell.

HEAT AND THERMODYNAMICS.

(Sheet G.)

Time, 2½ hours.

- H. and T. 1. What do you understand by the thermal efficiency of a heat engine?
 A test of an engine and boiler shows 1.05 pounds coal consumed per brake horsepower hour. The heat of combustion of the coal is 14,000 B. t. u. per pound. What is the thermal efficiency of the plant?
 Define: (a) Total heat of superheated steam.
 (b) Quality of steam.
- H. and T. 2. What weight of air at 200.3 pounds gauge and 140.5° F. is contained in a cylinder 6 feet in diameter and 20 feet long? A pound of air under atmospheric conditions occupies 12.4 cubic feet.
- H. and T. 3. Enumerate and explain the principal heat losses in a steam plant.
 Explain, with diagrams on the pressure-volume and temperature-entropy planes, the Carnot cycle.
- H. and T. 4. A 4-cycle Diesel engine with 6 single-acting cylinders of 16-inch bore and 24-inch stroke develops 500 b. h. p. at 180 revolutions per minute. What is the mean effective pressure based on the brake output?
- H. and T. 5. Ten pounds of water at 100° F., 5 pounds of ice at 32° F., and 1 pound of wet steam at 212° F., quality is 0.90, are mixed. What is the resultant temperature? (Latent heat of fusion of ice is 144 B. t. u. per pound and latent heat of steam is 970 B. t. u. per pound.)

HYDRAULICS.

(Sheet H.)

Time, 2½ hours.

- H. 1. (a) Explain what is meant by a contracted weir, a suppressed weir, and triangular weir. Which is the more accurate for measuring, a triangular or a rectangular weir?
 (b) In the flow of water from a tank through a sharp-edged orifice what coefficients have to be considered in finding the quantity of water flowing through this orifice?
- H. 2. (a) A pump is used to force feed water into a boiler. Explain the different heads that have to be taken into account in pumping the water.
 (b) How would you find the horsepower necessary to pump water to a certain height?
- H. 3. (a) Explain and describe a Piezometer tube, a pitot tube, and a Venturi meter.
 (b) A gate A feet wide and B feet high, hinged at the upper edge, is kept closed by the pressure of water standing C feet above the top. What force, applied normally at the bottom of the gate, would be required to open it?
- H. 4. A steel box, rectangular in plan, floats with a draft of 2 feet. If the box be 20 feet long, 10 feet wide, and 6 feet deep, find the time necessary to sink it by opening a standard orifice 6 inches square in its bottom. (Neglect thickness of sides.)
- H. 5. A pump supplies water to a nozzle. What horsepower at the pump will be necessary to maintain a stream of water having a velocity of 75 feet per second with the nozzle held 30 feet above the pump cylinder? The nozzle has a diameter of 1½ inches at the tip and a coefficient of 0.90. Neglect the friction due to the hose.

SHOP PRACTICE.

(Sheet I.)

Time, 3 hours.

- S. P. 1. Describe the operation of preparing a test specimen of boiler plate and method of obtaining its tensile strength.
- S. P. 2. Are rivet holes in boiler plate usually punched or drilled? What is meant by calking a joint, and how is it done? In what way may a riveted joint fail?
- S. P. 3. Describe briefly the Bessemer process of making steel. Describe briefly the rolling of an I beam.
- S. P. 4. What is meant by shrinkage allowance in pattern making? Explain briefly with sketch the making of a green sand mold. Explain briefly the difference between brazing and soldering.
- S. P. 5. Describe completely the forging and machining of a small bolt.

List of points authorized for professional examinations.

Alabama.....	Birmingham. Demopolis. Dothan. Florence. Huntsville. Mobile. C. H. Montgomery. Opelika.	District of Columbia.....	Washington.		Ames. Burlington. Cedar Rapids. Council Bluffs. Creston. Davenport. Denison. Des Moines. Dubuque. Fort Dodge. Iowa City. Mason City. Ottumwa. Sioux City. Spencer. Waterloo.
Arizona.....	Clifton. Douglas. Flagstaff. Globe. Phoenix. Prescott. Tucson. Yuma.	Florida.....	Gainesville. Jacksonville. Key West. Miami. Pensacola. Sanford. Tallahassee. Tampa.	Iowa.....	
		Georgia.....	Albany. Athens. Atlanta. Augusta. Columbus. Macon. Rome. Savannah. Thomasville. Waycross.		Concordia. Dodge City. Emporia. Fort Scott. Kansas City. Lawrence. Leavenworth. Manhattan. Norton. Pittsburg. Salina. Topeka. Wichita.
Arkansas.....	Camden. Fayetteville. Fort Smith. Helena. Jonesboro. Little Rock. Texarkana.	Hawaii.....	Honolulu. C. H.	Kansas.....	
		Idaho.....	Boise. Coeur d'Alene. Grangeville. Moscow. Pocatello. Sandpoint. St. Anthony. Twin Falls. Weiser.		Ashland. Bowling Green. Covington. Hopkinsville. Lexington. Louisville. Middlesboro. Owensboro. Paducah. Somerset.
California.....	Chico. Eureka. Fresno. Los Angeles. Red Bluff. Riverside. Sacramento. San Diego. San Francisco. San Jose. San Luis Obispo.	Illinois.....	Cairo. Urbana. Chicago. East St. Louis. Effingham. Freeport. Galesburg. Peoria. Quincy. Rock Island. Springfield.	Kentucky. ...	
Colorado.....	Colorado Springs. Denver. Durango. Fort Collins. Fort Morgan. Grand Junction. La Junta. Leadville. Monte Vista. Montrose. Pueblo. Trinidad.			Louisiana.....	Alexandria. Baton Rouge. Lake Charles. Monroe. New Iberia. New Orleans, C. H. Shreveport.
Connecticut....	Hartford. Middletown. New Haven. New London. Waterbury. Willimantic.	Indiana.....	Angola. Bloomington. Evansville. Fort Wayne. Indianapolis. Jeffersonville. La Fayette. Marion. Richmond. South Bend. Terre Haute. Valparaiso.	Maine.....	Bangor. Bath. Calais. Caribou. Houlton. Lewiston. Portland. Rockland.
Delaware.....	Dover. Wilmington.				

Maryland.....	(Baltimore. Cumberland. Easton. Salisbury.		(Alliance. Beatrice. Broken Bow. Chadron. Columbus. Grand Island. Holdrege. Lincoln. McCook. Nebraska City. Norfolk. North Platte. Omaha. O'Neill.		(Akron. Athens. Chillicothe. Cincinnati. Cleveland. Columbus. Dayton. Fronton. Lima. Mansfield. Marietta. Portsmouth. Sandusky. Steubenville. Toledo. Youngstown. Zanesville.
Massachusetts..	(Boston. Brockton. Fall River. Fitchburg. Hyannis. Lawrence. Lowell. Pittsfield. Salem. Springfield. Worcester.	Nebraska.....		Ohio.....	
Michigan.....	(Ann Arbor. Cheboygan. Detroit. Escanaba. Grand Rapids. Ironwood. Kalamazoo. Lansing. Manistee. Marquette. Saginaw. Sault Ste. Marie. Traverse City.	Nevada.....	(Carson City. Elko. Ely. Goldfield. Reno. Fallon.	Oklahoma.....	(Altus. Ardmore. Enid. Guthrie. Lawton. McAlester. Muskogee. Oklahoma. Vinita. Woodward. Astoria. Baker. Bend. Corvallis. Eugene. Grants Pass. Klamath Falls. Marshfield. Pendleton. Portland. The Dalles.
Minnesota.....	(Austin. Bemidji. Bramerd. Crookston. Duluth. Fergus Falls. International Falls. Mankato. Minneapolis. Pipestone. St. Cloud. St. Paul. Virginia. Willmar. Winona.	New Hampshire.	(Berlin. Concord. Hanover. Keene. Manchester. Plymouth. Portsmouth.	Oregon.....	(Altoona. Dubois. Erie. Galeton. Harrisburg. Philadelphia. Pittsburgh. South Bethlehem. State College. Uniontown. Warren. Wilkes-Barre. Williamsport.
Mississippi.....	(Corinth. Greenville. Grenada. Hattiesburg. Holly Springs. Jackson. Meridian. Natchez. Vicksburg. West Point.	New Jersey....	(Atlantic City. Camden. Newark. Trenton.	Pennsylvania..	(San Juan. Providence.
Missouri.....	(Cape Girardeau. Columbia. Jefferson City. Kansas City. Kirksville. Moberly. Poplar Bluff. St. Joseph. St. Louis, O.L.D.C.H. Springfield. Warrensburg.	New Mexico...	(Albuquerque. East Las Vegas. Las Cruces. Raton. Roswell. Santa Fe. Tucumcari.	Porto Rico....	
Montana.....	(Billings. Bozeman. Butte. Glasgow. Great Falls. Hayre. Helena. Kalispell. Miles City. Missoula.	New York.....	(Binghamton. Buffalo. Elmira. Ithaca. Jamestown. New York, C.H. Ogdensburg, C.H. Plattsburg. Poughkeepsie. Rochester. Syracuse. Troy. Utica.	Rhode Island..	(Charleston. Chester. Columbia. Florence. Greenville. Greenwood. Orangeburg. Sumter.
		North Carolina.	(Asheville. Charlotte. Durham. Goldsboro. Greensboro. Hickory. Raleigh. Salisbury. Washington. Wilmington.	South Carolina.	(Aberdeen. Brookings. Deadwood. Huron. Lemmon. Mitchell. Pierre. Rapid City. Sioux Falls. Watertown.
		North Dakota..	(Bismarck. Devils Lake. Dickinson. Fargo. Grand Forks. Minot. Valley City. Williston.	Tennessee.....	(Bristol. Chattanooga. Jackson. Knoxville. Memphis. Nashville.

Texas.....	C. H.	Virginia.....	Abilene.	Abingdon.	West Virginia.....	Bluefield.
			Amarillo.	Alexandria.		Charleston.
			Austin.	Charlottesville.		Elkins.
			Brownsville. C. H.	Clifton Forge.		Grafton.
			Bryan.	Lynchburg.		Hinton.
			Dallas.	Norfolk.		Huntington.
			El Paso.	Richmond.		Martinsburg.
			Houston.	Roanoke.		Morgantown.
			Lubbock.	Staunton.		Parkersburg.
			Nacogdoches.	Winchester.		Wheeling.
Utah.....		Washington....	San Angelo.	Aberdeen.	Wisconsin.....	Appleton.
			San Antonio.	Bellingham.		Ashland.
			Texarkana.	Centralia.		Chippewa Falls.
			Waco.	North Yakima.		La Crosse.
			Wichita Falls.	Pasco.		Madison.
Vermont.....	C. H.		Logan.	Port Townsend.	Wyoming.....	Marinette.
			Ogden.	Pullman.		Milwaukee.
			Provo.	Raymond.		Superior.
			Salt Lake City.	Seattle.		Wausau.
			Brattleboro.	Spokane.		Casper.
	C. H.		Burlington.	Tacoma.		Cheyenne.
			Montpelier.	Vancouver.		Cody.
			Newport.	Walla Walla.		Evanston.
			Rutland.	Wenatchee.		Lander.
			St. Albans. C. H.			Laramie.
			St. Johnsbury.			Rawlins.
						Rock Springs.
						Sheridan.

PHYSICAL EXAMINATION.

The physical examination will be held after the professional, and the candidate, *provided he successfully passes the professional examination*, will be authorized to appear for physical examination by a board of naval medical officers at one of the following naval stations: Portsmouth, N. H.; Boston, Mass.; Newport, R. I.; New York, N. Y.; Philadelphia, Pa.; Washington, D. C.; Annapolis, Md.; Norfolk, Va.; Charleston, S. C.; Pensacola, Fla.; New Orleans, La.; Great Lakes, Ill.; Las Animas, Colo.; Mare Island, Cal.; San Francisco, Cal.; and Puget Sound (Bremerton), Wash. As the necessary naval medical officers are available only at the above-mentioned places, physical examinations will not be conducted elsewhere.

Candidates must be physically sound in every respect, and those who have been selected for appointment will be authorized to report for physical examination before a board of medical examiners composed of medical officers of the Navy.

The physical qualifications of the applicants for appointment as officers in the Navy are decided upon by an examining board consisting of medical officers of the Navy. No material physical defect will be waived in any case for any reason.

A candidate must declare under oath that he labors under no mental or constitutional disease or weakness, nor any other imperfection or disability which may interfere with the most efficient discharge of the duties of an officer in any climate.

It is suggested that all candidates should first cause themselves to be thoroughly examined by a competent physician, particularly regarding eyesight, hearing, and heart trouble, thus avoiding the trouble and expense of appearing for examination when not physically qualified.

No allowances will be made for the expenses of persons appearing for either of the above examinations.

Table of physical proportions for height, weight, and chest measurement.

Height.	Weight.	Chest. ¹	Height.	Weight.	Chest. ¹
<i>Inches.</i>	<i>Pounds.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Pounds.</i>	<i>Inches.</i>
66	132	33½	70	155	35½
67	134	34	71	162	36
68	141	34½	72	169	36½
69	148	34½	73	176	36½

¹ Mean circumference.

It is not necessary that the applicant should conform exactly to the figures in the foregoing table, which is given to show what is regarded as a fair standard of physical proportions. A variation not exceeding 15 pounds, not to fall below 132 pounds in weight or 1 inch in the mean chest measurement, below the standard given in the table, is admissible when the candidate for appointment is active, has firm muscles, and is evidently vigorous and healthy. A chest expansion of less than $2\frac{1}{2}$ inches is a sufficient cause for the rejection of the applicant.

Any one of the following conditions will be sufficient to cause rejection:

(a) Feeble constitution, poor physique, impaired general health.

(b) Any disease or deformity, either congenital or acquired, which would impair efficiency, such as weak or deranged intellect, cutaneous diseases, parasites of the skin or its appendages, deformity of the skull, abnormal curvature of the spine, torticollis, inefficiency of joints or limbs, deformity of joints or bones, either congenital or the result of disease or injury, epilepsy or other convulsions, diseases of the eye, defective vision, color blindness, impaired hearing or disease of the ear, chronic nasal catarrh, ozena, polypi, great enlargement of the tonsils, impediment of speech, disease of heart or lungs, enlarged abdominal organs, evidence of sclerosis, tumors, hernia, undescended testicle, large varicocele, sarcocele, hydrocele, stricture, fistula, hemorrhoids, varicose veins, disease of the genito-urinary organs, deformed or diseased feet, evidences of intemperance or of the morbid use of drugs, loss of many teeth or teeth generally unsound (teeth properly filled not to be considered unsound). Every applicant must have at least 20 sound teeth and of these not less than 4 opposed incisors and 4 opposed molars.

(c) Any acute disease.

Acuteness of vision must be not less than 12/20 for each eye unaided by glasses, and capable of correction by glasses to 20/20.

No very close estimate can be made regarding time elapsing from passing of physical examination to issuing of appointment, probably a few weeks.

When an appointment is issued it is accompanied by a blank form of "Acceptance and oath of office," which the candidate is expected to fill out immediately and return to the department. Orders are then issued to report for duty.

PAY.

The pay of an ensign at sea is \$1,870 a year; on shore it is \$1,700 plus allowances for quarters, heat, and light.

Upon the completion of travel performed under orders, officers of the Navy are reimbursed at the rate of 8 cents per mile in lieu of traveling expenses.



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